

Requirements for Material Science

Geant4 Collaboration Meeting
25 September 2017

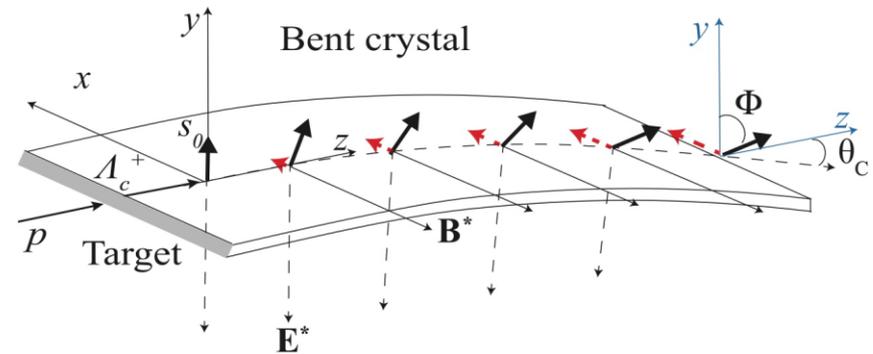
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Measuring Magnetic Dipole Moments of Charmed Baryons – group within UA9

- Request to support spin precession under channeling
 - Geant4 does not currently calculate precession in strong EM fields between crystal atomic planes

Spin Precession Under Channeling

- Recently it was proposed to perform experiment at LHC to measure the magnetic and electric spin precession of short-lived particles in bent crystals [1,2,3].
- For short-lived baryons, to be produced in a fixed-target experiment using the 7 TeV LHC beam and channeled in a bent crystal, the spin precession is induced by the intense electromagnetic field between crystal atomic planes.
- The channeling process in the Geant4 release currently does not support it. An implementation based on the G4EqEMFieldWithEDM class is under development [3].
 - [1] F.J. Botella et al. “On the search for the electric dipole moment of strange and charm baryons at LHC”, (2017) 10.1140/epjc/s10052-017-4679-y
 - [2] A.S. Fomin et al. “Feasibility of measuring the magnetic dipole moments of the charm baryons at the LHC using bent crystals”, (2017) [https://doi.org/10.1007/JHEP08\(2017\)120](https://doi.org/10.1007/JHEP08(2017)120)
 - [3] E. Bagli et al. “Electromagnetic dipole moments of charged baryons with bent crystals at the LHC”, (2017) arXiv:1708.08483



Search for Electric Dipole Moment of Strange and Charmed Baryons – group within LHCb

- Request process for diffusion of radioactive isotopes
- Request process for sticking of radioactive isotopes to materials

Effusion and Diffusion in ISOL Targets

- ISOL facilities allow the usage of radioisotopes beam for scientific studies.
- In the high-temperature target the radioisotopes escape from them and then diffuse until they are collected outside them.
- The isotopes can stick to the walls of the beam pipes losing time and can decay during their motion.
- The INFN team at Legnaro Laboratories and the CEA/CNRS/IN2P3 team at GANIL are interested in the Geant4 simulation of the process.

